

ON THE GENUS *EURYSTOMA* OF ALBERS (TYPE *VITTATA*,
MÜLLER), ITS ANATOMY AND REFERENCE TO OTHER
INDIAN SPECIES.

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PLATE IV.

LAST July I received from Dr. W. T. Blanford some specimens of this species preserved in alcohol, which had been obtained in the Tinnevely District, Madras, through Dr. Thurston, of the Madras Museum, to whom our thanks are once more due for supplying us with the animals of several interesting land-shells. This species (*vittata*) is of interest as it was made the type of a genus by Dr. J. C. Albers under the title of *Eurystoma*,¹ and is the first of the two species that author included in it. The second species, *H. deflexa*, Pfr. (*exdeflexa* of Pilsbry), from Cuba, is placed by the latter author in *Eurycampta*.

The genus was founded on shell character alone, and is thus described from a Ceylon example:—"Testa umbilicata, depressoglobosa, solida, spira brevis, obtusa; anfractus 5 planulati, ultimus basi inflatus, antice descendens; apertura lunari-ovata; peristoma expansum, marginibus conniventibus, callo junctis, columellari umbilicium semitegente."

Conchologically the type shell has been associated by early writers with *Helix* (*Arianta*) *arbustorum*; Adams places it in *Macrocyclis*, a South American genus; G. Nevill² has it in *Planispira*, and records a single specimen from Java as coming from Ferdinand Stoliczka's collection, but extension to this island would be remarkable, and its occurrence there requires verification.

Description of Animal.—The visceral sac (Fig. 3) has no markings of any kind, being a rich ochre colour throughout, more intense on the apex, and near the mantle-zone it is burnt sienna colour. From the appearance of the foot in spirit it would appear to be broad and rounded at the posterior end in the living animal. There is no peripodial line; the surface of the sides is smooth, broken up by close-set radiating grooves. The main divisions of these are well seen on the sole of the foot, gradually fining out towards a plain central area. This last becomes more pronounced anteriorly, and nearer the head it is strongly divided down the middle, and is further split up and finely streaked longitudinally; the muscles of the foot apparently have this arrangement, which is intensified by contraction in the spirit. A central and the side areas of the sole of the foot are a conspicuous character (Fig. 2). The mantle-edge is quite straight and simple. The

¹ "Die Heliceen," 1850, p. 126.

² Handlist, p. 76.

right dorsal lobe is large, the left very small. The pulmonary cavity is not very capacious. The renal organ (Fig. 6) is elongate, with an even width, the heart being situated at the posterior end.

The generative organs (Figs. 9-11) are very simple, there being neither dart-sac nor digitate glands, and no cæcum to the spermatheca duct. The albumen gland is remarkably large. The spermatheca is a long narrow duct with a pear-shaped swelling at the distal end. The penis has a short flagellum, at the base of which the vas deferens is attached. There is a bulbous swelling or knob, below which the retractor muscle is attached, and this muscle, spreading over the sheath, gives rise to another strong retractor, having its attachment on the body-wall near the reproductive aperture.

The jaw (Fig. 5) has six well-marked folds and an indistinct one on each outer side, thus eight in all.

In the radula (Figs. 4, 8) the formula is 34·16-1-16·34 or 50-1-50. The central teeth are broad, not very pointed, with no side cusps, only a slight emargination, the merest indication of them; at about the 22nd median tooth a small lateral ectocone makes its appearance; in the outer teeth, about the 36th, both mesocone and ectocone become bicuspid on a more elongate oblong plate, thence the plates become narrower and narrower towards the extreme margin with irregular denticles here and there, showing only a trace of the form of the 35th tooth.

As might be expected, this genus of the Helicidæ differs widely from European genera represented by *Pomatia* (*pomatia*), *Tachea* (*nemoralis*), *Euparypha* (typical *Pisana* and *desertorum*), *Arianta* (*arbustorum*), etc. I have not sufficiently gone into the anatomy of the genera of Helicidæ to make any useful comparison, and many Indian species remain to be examined before changes are made in classification.

Ferdinand Stoliczka made perhaps the first dissections of Indian Helicidæ. In the Journal of the Asiatic Society of Bengal, 1871, pp. 223-228, he described the genus *Trachia*, of which the type is *asperella*, Pfr., from Bengal. The species described by Stoliczka is *delibrata*, a species with a wide range in eastern India. Pl. xvi, figs. 1-3 show that the genitalia are of the same simple type, with no glands, appendages, or dart-sac present. The jaw especially and radula, however, differ, but not materially. In 1873, in the same journal, pp. 24-26, Stoliczka described *Trachia Penangensis*. In this species we find the generative organs approach nearer to those of *E. vittata*, especially in the form of the spermatheca. The jaw is also similar in having fewer ribs, and the radula is evidently of the same type, but the teeth are on narrower plates and more pointed. As far as the animals are concerned, *Eurystoma* and *Trachia* with *Planispira* (vide *H. argillacea*, Fér., from Timor: Semper, pl. xv, fig. 19) come near each other. On the other hand, their shells differ very much in form, and particularly in type of sculpture. In this instance it is unfortunate that Stoliczka says nothing about the sole of the foot in his description of the animals of *Trachia* which he dissected, and from this I infer there was nothing remarkable to note. The divided

anterior portion (Fig. 2), present in three specimens I have looked at, is of importance, for it is of a different nature altogether from the division of the sole of the foot as seen in genera of the Zonitidæ, and it is not a feature in the foot of the true Helicidæ. If this character should not be found in *Trachia asperella*, *delibrata*, etc., *vittata* cannot then be included with them. It should also be ascertained how far other Indian species of Helicidæ agree in this respect with *vittata*. Albers' name *Eurystoma*, used in this paper, I am informed cannot be retained, being preoccupied, but this is not of importance particularly, should the animal of *vittata* be finally found to be similar in all respects to that of *asperella*, the type of *Trachia*, and this species has yet to be examined. In searching through the Helicidæ in Semper's work, "Reisen im Archipel der Philippinen," for species with similar characters, I was struck by the great and interesting similarity of the generative organs of *Buliminus* (*Petræus*) *Siamensis*, Redfield (pl. xiv, fig. 15), and also of the radula (pl. xvii, fig. 23) with those of *vittata*. I have lately been working at the anatomy of *Glessula*, and, as shown in the species *tenuispira*, Benson, there is no great difference in its generative organs and those of *Eurystoma*. Although the shells of these genera are dissimilar in every respect, from a phylogenetic point of view the animals of Indian forms of the Helicidæ, such as those under review, and as far as they are known, more nearly resemble those of species of *Stenogyra* and *Buliminus* than they do the true Helices of the Palearctic region. This, however, may be only parallel development on similar lines. It is very apparent that Indian forms of Helicidæ have started from a very distinct and separate stem to that of their more western congeners.

EXPLANATION OF PLATE IV.

- Fig. 1. Aperture, showing mantle-lobes and sole of foot. $\times 4.5$.
 ,, 2. Sole of foot, anterior part. $\times 4.5$.
 ,, 3. Anterior portion of visceral sac.
 ,, 4. Central and admedian teeth of the radula.
 ,, 5. Jaw. $\times 24$.
 ,, 6. Renal organ, heart, etc.
 ,, 7. Buccal mass with salivary glands.
 ,, 8. Outer teeth of the radula, 34th to 36th, and 46th to 47th.
 ,, 9, 10. Penis, viewed from different sides.
 ,, 11. Portion of the genitalia, spermatheca, ovotestis, and albumen gland.
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| <i>au.</i> auricle. | <i>res.ap.</i> respiratory aperture. |
| <i>k.</i> renal organ. | <i>s.gd.</i> salivary gland. |
| <i>m.</i> mantle-edge. | <i>u.</i> ureter. |
| <i>p.v.</i> pulmonary vein. | <i>v.d.</i> vas deferens. |
| <i>r.m.</i> retractor muscle. | |